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BHCTP Monthly Discharge Monitoring Report

Month:	March-18	
Facility:	Central Treatment Plant	
Location:	Bunker Hill Superfund Site	
Contract Number:	W912DW-16-C-0012	Amec Foster Wheeler

Total Flow For The Month From 006 Outfall:	68,721,800	gallons estimated
Process sludge pumping to CIA sludge pond:	2,070,000	gallons estimated
Polishing Pond Dilution Water	**970,000**	gallons estimated
Total Flow From Kellogg Tunnel:	68,907,980	gallons

Percent of Influent Successfully Treated: 100.0%

13 sample days * 6 parameters (Pb, Cd, Zn, Mn, TSS & pH) = 78 potential exceedances
78 - 0 exceedances = 78 78/78 = 100%

Results of Sampling Efforts:

All sampling has been performed in accordance with specifications and the Sampling and Analysis Plan.

Performance Evaluation (PE) sampling was not performed for this reporting period.

Trip blank and rinsate sampling was performed, with the results being reported on the 'PTM-004,RB,TB' page of this DMR.

Highlights of Plant Maintenance and/or Plant Optimization:

03-01-18 Performed monthly fire extinguisher inspection. All CTP fire extinguishers are fully charged and in good working condition at this time.

03-01-18 Performed monthly pump and motor inspection. All CTP pumps and motors are in good condition at this time.

03-05-18 Provided assistance to AFW management in performing confined space evaluation and leak testing of the temporary discharge line (TDL).

03-06-18 Operators removed the Polishing Pond water supply used for lime slurry dilution water from service. City water will now be utilized for lime slurry dilution as the Polishing Pond water will no longer be available . The city water supply used for lime slurry dilution was tested during a slaker B run cycle with no issues. City water used for lime slurry dilution was pre set at 37 gpm discharge at this time.

03-06-18 CTP operating staff attended AFW Environmental Awareness Training provided by the Environmental Manager.

03-08-18 CTP operating staff developed a daily sludge pumping and sludge line draining SOP that included preventing sludge flow to the CTP pump room during daily Polishing Pond sludge pumping. CTP operators flushed and drained the sludge wasting pipeline in preparation for the Polishing Pond pumping use. The Polishing Pond pumping crew tested the Godwin Pump piping and connections prior to pumping from the Polishing Pond to the CIA through the existing sludge wasting pipeline.

03-12-18 Removed the Polishing Pond pumps from service. Flocculant mixing and lime slurry dilution water will be city supply water as the Polishing Pond has been removed from service.

03-13-18 Operators performed the monthly no load emergency generator run test. The emergency generator operated for one half hour as programmed with no issues or errors to report.

03-13-18 Operators completed the CTP pump, motor and gear unit six month oil changes. No issues or corrective actions to report. All used oil was removed from the CTP site.

03-18-18 11:30pm Operators responded to an auto-dialer alarm caused by low process pH.
Mine flow surge from approximately 1800 gpm to approximately 2500 gpm caused the process pH to decrease from 8.40 to 6.90. It is assumed that a muck dam release within the mine caused the flow surge.
03-19-18 12:20am the mine flow decreased to approximately 1850 gpm. **03-19-18 10:30am** a second mine flow surge of approximately 2500 gpm passed through the plant. Operators performed several manual lime feed adjustments to maintain a process pH of approximately 8.40. **03-19-18 11:15am** the mine discharge flow decreased to 1850 gpm.
03-19-18 2:00pm the mine flow decreased from 1850 gpm to approximately 850 gpm.
03-19-18 3:00pm the mine flow increased from 850 gpm to approximately 1800 gpm.

03-20-18 06:00 Operators discovered that the small water pump used to provide 24/hr composite sample flow had failed. The small pump was apparently not made for continuous pumping. CTP operators connected the composite sampler directly to the CTP temporary discharge pipeline. The 24/hr composite sampler was programmed to purge and rinse the additional distance. The composite sampler was tested and placed into service sampling 250 mg/hour.

03-20-18 The treated outfall pH probe will now be decommissioned. The outfall flow no longer passes through the outfall building. The newly installed pH and turbidity meter located at the Clarifier overflow will be commissioned after some modifications. The probe mounting unit will need to be modified to allow operators access to calibrate and maintain maintain the probe units. Mr. Lee has been notified of the needed mounting modifications.
The treated discharge pH readings will now be taken at the Clarifier overflow trough. Daily treated outfall grab sample pH verification will be taken at the temporary outfall discharge location and documented on the CTP daily log.

03-22-18 The treated outfall flow meter has failed. AFW management is working with the manufacturer to correct the issue. CTP operators will estimate the daily treated outfall flow based on the KT discharge and the daily sludge wasting.
Example: KT discharge 1750 gpm (24/hr=2,520,00 - 72,000 sludge (2hr @ 600 gpm) = 2,448,000 estimated discharge flow.
Treated discharge use to dilute the Polishing Pond sludge will be estimated and deducted from the treated outfall total.

03-22-18 CTP operators now perform manual monitoring of three treatment plant components as electronic monitoring has been eliminated. Components: Cathodic Protection System, Treated Outfall pH, Treated Outfall daily flow.

03-27-18 Operators performed the monthly full load emergency generator run test. The emergency generator operated all CTP components for one hour as programmed with no issues or errors to report.

03-27-18 Operators installed a staff gauge extension on the CIA staff gauge to extend the monitoring level beyond the existing 10' capability. The current CIA sludge level is documented on the attached CIA sludge pond report.
Notified AFW management team of a possible discrepancy in the CIA sludge pond life expectancy.

03-29-18 Estimated gallons pumped to the CIA from the Polishing Pond cleanout project: 2,718,000 gallons
Estimated gallons: 912,000 gallons of sludge from the P.Pond, 836,000 gallons of water from the P. Pond and 970,000 gallons of dilution water combined with the sludge.

03-31-18 Performed monthly reset of the KT and treated outfall flow meters. Documented monthly totals on the KT & 006 flow page of this report.

- The Kellogg Tunnel discharge flow increased by 17% from March 2017, from 58.9 MG to 68.9 MG.

- The Kellogg Tunnel zinc concentration decreased by 29% from March 2017, from an average of 124 mg/L to 88 mg/L.

- The CTP operating pH set point was increased from 8.4 to 8.5 during Lined Storage Pond pumping events this reporting period.

- The flocculent dosage was increased from approximately 1.4 PPM to 2.0 PPM during lined storage pond pumping events.

- The CTP sludge recycle rate remained at 400 gpm.

- CTP operators received one off-shift auto dialer call-out alarm caused by KT discharge flow surge of 2500gpm as noted 03-18-18.

- CTP operators performed four pumping events from the Lined Storage Pond.

- CTP operators verified Aeration Basin pH probe and grab sample values twice per day.

Lessons Learned:
The CIA Sludge Pond will not achieve the estimated life span reported in previous DMR's due to the dike elevation discrepancy.

MONITORING PERIOD					
YEAR	MO	DAY	YEAR	MO	DAY
2018	3	1	2018	3	31

PARAMETER		Quantity or Loading			Quality or Concentration					
		MONTHLY AVERAGE	DAILY MAXIMUM	UNITS	MINIMUM	MONTHLY AVERAGE	DAILY MAXIMUM	UNITS	FREQUENCY OF ANALYSIS	SAMPLE TYPE
pH	Sample Measurement				6.80		7.10		Continuous	Meter
	Permit Required				6.0		10.0			
Flow Thru Treatment Plant	Sample Measurement	2.22	2.63	mgd						
	Permit Required		Daily							
Lead Total - Pb Effluent	Sample Measurement	0.05	0.09	lbs/day		0.003	0.003	mg/L	three samples/ week	Comp 24
	Permit Required	14.8	37.0			0.30	0.60	mg/L		
Zinc Total - Zn Effluent	Sample Measurement	4.58	8.58	lbs/day		0.26	0.39	mg/L	three samples/ week	Comp 24
	Permit Required	36.2	91.3			0.73	1.48	mg/L		
Cadmium - Cd Effluent	Sample Measurement	0.06	0.139	lbs/day		0.003	0.006	mg/L	three samples/ week	Comp 24
	Permit Required	2.40	6.10			0.050	0.100	mg/L		
Manganese - Mn Effluent	Sample Measurement	422	589	lbs/day		22.3	30.3	mg/L	three samples/ week	Comp 24
	No Permit Required					N/A	N/A	mg/L		
Total Suspended Solids - TSS	Sample Measurement	20.8	37	lbs/day		1.1	1.8	mg/L	three samples/ week	Comp 24
	Permit Required	985	1907			20	30	mg/L		

PREPARED BY: GARY FULTON

REVIEWED BY: KESTIN SCHULZ

NPDES DISCHARGE POINT 006
CENTRAL TREATMENT PLANT
MONTH: Mar-18

DAY	LEAD (Pb)		ZINC (Zn)		CADMIUM (Cd)		MANGANESE (Mn)		pH	FLOW	TSS		LOADING
	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		mgd	mg/L	lbs/day	kg/day
1		0.095		0.09		0.09		553		2.4		27.6	12.5
2	0.0026	0.051	0.218	4.24	0.0048	0.09	28.1	546	6.90	2.3	1.4	27.2	12.3
3		0.054		4.53		0.10		584		2.5		29.1	13.2
4		0.051		4.29		0.09		552		2.4		27.5	12.5
5	0.0026	0.049	0.205	3.88	0.0045	0.09	28.2	534	6.90	2.3	0.6	11.4	5.15
6		0.054		4.27		0.09		587		2.5		12.5	5.67
7	0.0026	0.051	0.228	4.43	0.0004	0.01	30.3	589	7.00	2.3	1.0	19.4	8.81
8		0.049		4.31		0.01		572		2.3		18.9	8.56
9	0.0025	0.047	0.210	3.97	0.0008	0.02	28.0	530	6.90	2.3	0.6	11.4	5.15
10		0.047		3.91		0.01		521		2.2		11.2	5.06
11		0.047		3.91		0.01		521		2.2		11.2	5.06
12	0.0025	0.049	0.220	4.35	0.0008	0.02	29.0	573	6.80	2.4	1.0	19.8	8.96
13		0.028		2.42		0.01		319		1.3		11.0	5.00
14	0.0025	0.050	0.327	6.54	0.0008	0.02	19.1	382	6.90	2.4	1.6	32.0	14.5
15		0.039		5.13		0.01		300		1.9		25.1	11.4
16	0.0025	0.034	0.305	4.13	0.0064	0.09	16.0	217	6.90	1.6	0.8	10.8	4.91
17		0.046		5.59		0.12		293		2.2		14.7	6.65
18		0.054		6.62		0.14		347		2.6		17.4	7.88
19	0.0025	0.055	0.391	8.58	0.0063	0.14	25.4	557	6.90	2.6	1.0	21.9	9.95
20		0.050		7.86		0.13		511		2.4		20.1	9.12
21	0.0025	0.049	0.231	4.48	0.0045	0.09	21.9	425	7.00	2.3	0.8	15.5	7.04
22		0.051		4.72		0.09		447		2.4		16.3	7.41
23	0.0025	0.051	0.190	3.88	0.0039	0.08	22.3	456	7.00	2.4	1.8	36.8	16.7
24		0.051		3.88		0.08		456		2.4		36.8	16.7
25		0.051		3.88		0.08		456		2.4		36.8	16.7
26	0.0025	0.051	0.213	4.35	0.0046	0.09	24.1	492	7.10	2.4	1.2	24.5	11.1
27		0.024		2.03		0.04		230		1.1		11.4	5.19
28	0.0025	0.033	0.290	3.80	0.0008	0.01	11.7	153	7.00	1.6	1.2	15.7	7.13
29		0.030		3.46		0.01		140		1.4		14.3	6.49
30	0.0025	0.048	0.348	6.68	0.0008	0.02	5.63	108	6.90	2.3	1.4	26.9	12.2
31		0.056		7.74		0.02		125		2.7		31.1	14.1
Total	0.033	1.493	3.376	141.97	0.039	1.892	289.73	13078.1	90.200	68.72	14.400	646.29	293.10
Sample Events	13	31	13	31	13	31	13	31	13	31	13	31	31
Daily Average	0.003	0.048	0.260	4.58	0.003	0.061	22.3	422	6.94	2.22	1.11	20.8	9.45
Lab Detection Limit	**0.0026**		**0.002**		**0.0004**		**0.0025**		**0.01**		**0.080**		

MIN	0.003	0.024	0.190	0.095	0.000	0.008	11.700	153.387	6.800	1.143	0.600	10.835	4.914
MAX	0.003	0.095	0.391	8.581	0.006	0.139	30.300	588.643	7.100	2.630	1.800	36.771	16.676

Notes:
(X mg/L) * (1 kg/10^6 mg) * (2.205 lbs/kg) * (3.785 L/gal) * (10^6 gal/Mgal) * (Y Mgal/day) = (X) * (Y) * (8.345) in lbs/day
(X lbs/day) * (1 kg/2.205 lbs) = (X) / (2.205) in kg/day

verified by Kestin Schulz 04/10/2018

KELLOGG TUNNEL DISCHARGE
CENTRAL TREATMENT PLANT
MONTH: Mar-18
Data from SVL

DAY	LEAD (Pb)		ZINC (Zn)		CADMIUM (Cd)		MANGANESE (Mn)		pH	006 FLOW		TSS	
	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		mgd	mg/L	lbs/day	kg/day
1	0.722	14.22	86.4	1,702	0.148	2.91	111	2,186	3.10	2.36	116	2,285	1,036
2		14.04		1,680		2.88		2,159		2.33		2,256	1,023
3		15.00		1,795		3.08		2,306		2.49		2,410	1,093
4		14.20		1,699		2.91		2,182		2.36		2,281	1,034
5	0.713	13.50	80.7	1,528	0.134	2.54	109	2,064	3.10	2.27	110	2,083	944.6
6		14.85		1,681		2.79		2,270		2.50		2,291	1,039
7		13.85		1,568		2.60		2,118		2.33		2,137	969.2
8	0.639	12.07	89.6	1,692	0.148	2.79	117	2,210	3.10	2.26	96.0	1,813	822.2
9		12.09		1,696		2.80		2,214		2.27		1,817	824.0
10		11.89		1,667		2.75		2,177		2.23		1,786	810.2
11		11.89		1,667		2.75		2,177		2.23		1,786	810.2
12	0.627	12.39	82.1	1,622	0.125	2.47	111	2,193	3.00	2.37	112	2,213	1,004
13		6.91		904		1.38		1,223		1.32		1,234	559.5
14		12.55		1,643		2.50		2,221		2.40		2,241	1,016
15	0.677	10.62	126	1,977	0.261	4.09	36.9	578.9	2.80	1.88	32.0	502.0	227.7
16		9.17		1,707		3.53		499.8		1.62		433.4	196.6
17		12.41		2,310		4.79		676.5		2.20		586.7	266.1
18		14.70		2,736		5.67		801.2		2.60		694.8	315.1
19	0.703	15.43	69.1	1,517	0.122	2.68	101	2,217	3.10	2.63	117	2,568	1,165
20		14.14		1,390		2.45		2,031		2.41		2,353	1,067
21		13.64		1,341		2.37		1,960		2.33		2,271	1,030
22	0.657	13.42	74.8	1,528	0.131	2.68	97.0	1,982	3.10	2.45	113	2,308	1,047
23		13.42		1,528		2.68		1,982		2.45		2,308	1,047
24		13.42		1,528		2.68		1,982		2.45		2,308	1,047
25		13.42		1,528		2.68		1,982		2.45		2,308	1,047
26	0.701	14.32	73.8	1,508	0.126	2.57	94.6	1,933	3.00	2.45	134	2,737	1,241
27		6.69		704		1.20		902		1.14		1,278	580
28		9.19		968		1.65		1,240		1.57		1,757	797
29	0.658	7.85	113.0	1,348	0.246	2.94	34.3	409	2.80	1.43	25.0	298	135
30		12.63		2,169		4.72		658		2.30		480	218
31		14.63		2,512		5.47		763		2.66		556	252
Total	6.10	388.55	795.50	50842.1	1.44	92.00	811.80	52297.1	27.10	68.72	855.00	54381.8	24662.9
Sample Events	9	31	9	31	9	31	9	31	9	31	9	31	31
Daily Average	0.677	12.5	88.4	1,640	0.160	2.97	90.2	1,687	3.01	2.22	95	1754	796

Notes:
(X mg/L) * (1 kg/10^6 mg) * (2.205 lbs/kg) * (3.785 L/gal) * (10^6 gal/Mgal) * (Y Mgal/day) = (X) * (Y) * (8.345) lbs/day
(X lbs/day) * (1 kg/2.205 lbs) = (X) / (2.205) kg/day

verified by Kestin Schulz 04/10/2018

PTM Effluent at Lined Storage Pond **Month: Mar-18**
CENTRAL TREATMENT PLANT

DATE	LEAD mg/L	ZINC mg/L	CADMIUM mg/L	pH s.u. CTP Lab	TSS mg/L
03/08/18	0.0097	10.7	1.13	7.40	0.4
03/22/18	0.0087	11.2	1.16	7.10	0.2

RINSATE AND TRIP BLANKS **Month: Mar-18**
CENTRAL TREATMENT PLANT

Rinsate and Trip Blank samples will be taken approximately every 20 QC events, or one each per month.

LOCATION Rinsate & Trip Blank	DATE	SAMPLE	LEAD mg/L	ZINC mg/L	CADMIUM mg/L
Kellogg tunnel Discharge		RB-03-05-18	<0.0025	<0.003	<0.0008
Trip Blank (D.I.water)		TB-03-05-18	<0.0025	0.003	<0.0008

verified by Kestin Schulz 04/16/2018

Bunker Hill Central Treatment Plant

Daily log March 2018

				AERATION BASIN					CLARIFIER						DISCHARGE 006								RECYCLE SG		LIME SLURRY			SLUDGE PUMP		POND PUMP		SLUDGE GUN TEST		LINED POND
		INFLUENT KT			a.m.		p.m.		a.m.		p.m.				a.m.		p.m.		DO	1/wk							Injection Valve	Est.	600gpm					ESTIMATED
DATE	Operators	GPM	pH	SET	pH1	grab	pH1	grab	pH2	grab	pH2	grab	TURB	TEMP	pH3	grab	pH3	grab	PPM	TEMP	TURB	FLOW	SG	GPM	SG	%solid	Closed/Open	pump #	min	ON	OFF	10' Out	20' Out	Elevation (mg)
3/1	GF,SB,GC	1690	2.59	8.4	8.4	8.4	8.4	8.3	8.0	8.0	8.2	7.9	1.10	47	7.3	7.2	7.4	7.2			0.95	2.36	1.054	400	1.070	10.8	151/35	3	120			13"	8"	2269.5 (1.25mg)
3/2	GF,GC			8.4	8.4	8.4	8.4	8.3	8.0	7.9	8.0	8.0	1.30	46	7.2	7.2	7.3	7.2			1.25	2.33	1.056	400	1.068	10.5	150/35	3	120					2269.5
3/3	GC			8.4	8.4	8.4	8.4	8.4	7.9	7.8	8.1	7.9	0.95	41	7.3	7.4	7.4	7.3			0.89	2.49	1.056	400	1.068	10.5	151/35	3	120					2269.5
3/4	GF			8.4	8.4	8.4	8.4	8.4	7.9	7.9	8.0	7.9	1.10	40	7.3	7.2	7.2	7.2			0.80	2.36	1.057	400	1.066	10.2	152/35	3	120					2269.5
3/5	GF,SB	1670	2.60	8.4	8.4	8.4	8.4	8.4	7.9	8.0	8.1	7.9	1.13	42	7.2	7.2	7.2	7.1			0.85	2.27	1.060	400	1.067	10.4	153/35	3	130					2270.0 (1.5mg)
3/6	GF,SB,GC			8.4	8.4	8.4	8.4	8.4	7.9	7.9	8.1	8.1	1.20	40	7.3	7.2	7.4	7.3			1.14	2.50	1.053	400	1.067	10.4	154/35	3	120					2270.0
3/7	GF,SB,GC			8.4	8.4	8.3	8.4	8.4	8.0	7.9	8.0	7.9	1.30	48	7.3	7.1	7.4	7.2	9.9	6.7c	1.41	2.33	1.054	400	1.065	10.1	144/35	3	115					2270.0
3/8	GF,SB,GC	1597	2.67	8.4	8.4	8.4	8.4	8.4	7.8	7.9	8.0	8.1	1.18	50	7.3	7.3	7.4	7.3			1.20	2.26	1.058	400	1.064	10.0	141/35	3	120					2270.0
3/9	GF,GC			8.4	8.4	8.4	8.4	8.4	8.0	8.0	8.0	8.0	0.90	51	7.3	7.2	7.2	7.2			0.80	2.27	1.056	400	1.064	10.0	141/35	3	120					2270.5 (1.8mg)
3/10	GC			8.4	8.4	8.4	8.4	8.4	7.8	7.9	8.0	7.8	1.32	46	7.5	7.2	7.5	7.2			1.15	2.23	1.061	400	1.065	10.1	156/35	3	130					2270.5
3/11	SB			8.4	8.4	8.5	8.4	8.4	7.8	8.1	7.9	8.1	1.30	44	7.4	7.2	7.5	7.2			1.23	2.23	1.058	400	1.064	10.0	154/35	3	120					2270.5
3/12	GF,SB	1695	2.50	8.4	8.4	8.3	8.4	8.4	7.8	8.0	7.9	7.9	1.25	45	7.4	7.2	7.3	7.3			1.24	2.37	1.054	400	1.065	10.1	155/35	3	120					2270.5
3/13	GF,SB,GC			**8.5**	8.5	8.5	8.6	8.5	7.8	8.0	8.0	8.1	1.35	46	7.3	7.2	7.4	7.2			1.33	1.32	1.040	400	1.064	10.0	233/25	3	70	#3 07:00	12:00			2270.5
3/14	GF,SB,GC			8.4	8.4	8.4	8.4	8.4	7.8	8.0	7.9	8.0	1.30	50	7.3	7.1	7.3	7.3	9.9	6.6c	1.02	2.40	1.056	400	1.065	10.1	148/35	3	120					2270.0 (1.5mg)
3/15	GF,SB,GC	826	2.42	**8.5**	8.5	8.4	8.5	8.6	7.8	8.1	8.2	7.9	1.00	48	7.4	7.3	7.4	7.3			0.97	1.88	1.047	400	1.065	10.1	339/35	3	90	#3 05:45	13:00			2270.5 (1.8mg)
3/16	GF,SB			**8.5**	8.5	8.5	8.4	8.4	7.9	7.8	8.1	8.1	1.40	44	7.3	7.2	7.3	7.2			1.20	1.62	1.031	400	1.066	10.2	223/25	3	60					2269.5 (1.25mg)
3/17	GC			8.4	8.4	8.4	8.4	8.4	7.8	8.0	8.1	7.9	0.75	44	7.3	7.4	7.3	7.3			0.97	2.20	1.056	400	1.067	10.4	147/35	3	120					2269.5
3/18	SB	2500		8.4	8.4	8.4	8.4	8.5	7.9	8.0	8.1	8.1	0.85	50	7.3	7.2	7.3	7.2			0.77	2.60	1.053	400	1.066	10.2	151/35	3	120					2269.5
3/19	GF,SB	2500	2.61	8.4	8.6	8.4	8.6	8.4	7.7	8.0	8.0	7.9	1.30	47	7.2	7.2	7.2	7.2			1.00	2.63	1.056	400	1.065	10.1	169/35	3	150					2269.5
3/20	GF,SB,GC			8.4	8.5	8.5	8.5	8.5	7.9	8.1	8.1	8.2	1.02	46	7.0	7.0	7.1	7.1			0.84	2.41	1.053	400	1.067	10.4	143/35	3	120					2269.5
3/21	GF,SB,GC			8.4	8.5	8.4	8.4	8.4	8.0	8.1	8.3	7.8	1.00	51	N/A	7.1	N/A	7.3	9.8	6.7c	0.90	2.33	1.054	400	1.066	10.2	145/35	3	120					2269.5
3/22	SB,GC	1750	2.64	8.4	8.4	8.4	8.4	8.4	7.9	8.1	8.2	8.1	1.22	50	8.0	7.8	7.9	7.8			1.40	2.45	1.055	400	1.068	10.5	147/35	3	120					2269.5
3/23	GC			8.4	8.4	8.4	8.4	8.5	8.0	7.9	8.1	8.1	0.94	51	8.0	7.9	8.1	8.0			1.24	2.45	1.056	400	1.068	10.5	153/35	3	120					2269.5
3/24	GC			8.4	8.4	8.5	8.4	8.4	8.0	8.2	8.2	8.0	0.87	50	8.0	8.1	8.0	8.0			0.75	2.45	1.056	400	1.069	10.7	154/35	3	120					2270.0 (1.5mg)
3/25	SB			8.4	8.4	8.5	8.4	8.4	8.0	8.1	8.1	8.1	0.96	48	8.1	7.9	8.0	8.0			0.88	2.45	1.054	400	1.068	10.5	157/35	3	120					2270.0
3/26	GF,SB	1750	2.65	8.4	8.4	8.5	8.5	8.5	8.0	8.0	8.2	8.0	1.05	50	8.0	8.0	7.8	8.0			1.00	2.45	1.051	400	1.066	10.2	149/35	3	120	#3 10:45	13:00			2270.0
3/27	GF,SB,GC	850		**8.5**	8.5	8.5	8.5	8.5	7.8	8.0	8.0	8.2	1.20	50	7.9	7.6	8.0	8.1			1.19	1.14	1.036	400	1.066	10.2	237/25	3	60	#3 06:00	13:00			2270.25 (1.69mg)
3/28	GF,SB,GC			**8.5**	8.5	8.5	8.6	8.6	7.8	7.9	8.1	8.0	0.80	45	8.1	8.0	7.8	8.1	9.7	6.5	1.10	1.57	1.038	400	1.066	10.2	232/25	3	65	#3 06:00	11:00			2269.0 (1.0mg)
3/29	GF,SB,GC	826	2.40	**8.5**	8.5	8.5	8.4	8.4	7.7	8.1	8.0	8.0	0.90	40	7.9	8.1	8.0	7.9			0.90	1.43	1.035	400	1.065	10.1	242/25	3	60					2268.5 (0.75mg)
3/30	GF,GC			8.4	8.4	8.4	8.4	8.4	7.7	8.0	8.0	8.2	0.65	50	7.9	7.8	8.0	8.1			0.75	2.30	1.059	400	1.067	10.4	152/35	3	120					2268.5
3/31	GC			8.4	8.4	8.4	8.4	8.4	7.7	8.0	7.9	7.8	0.56	50	8.1	7.9	8.1	7.9			0.77	2.66	1.059	400	1.067	10.4	155/35	3	120					2268.5
Averages:				8.42	8.44	8.42	8.43	8.41	7.87	7.98	8.06	7.98	**1.07**	47	7.52	7.42	7.54	7.47	PPM	*c	1.03	2.22	1.05						111					
Notes:																												3450					
	03-12-18 The Polishing Pond pumps have been removed from service. Flocculant mixing and lime dilution will now be city water supply as the Polishing Pond have been removed from service.																											2,070,000	Gallons				
	03-12-18 14:15 KT flow decreased from 1695 gpm to approximately 600 gpm. Ph set point was increased to 8.50 from 8.40.																																
	03-13-18 07:00-12:00 Diverted KT flow of approximately 600 gpm to the lined storage pond. Activated the #3 lined storage pond pump from 07:00-13:00 approximately 2000 gpm.																																
	03-13-18 13:30 KT flow increased from approximately 600 gpm to 1750 gpm. PH set point decreased from 8.5 to 8.4																																
	03-14-18 Past 24hr flow estimated: 2,198,253 outfall flow meter reading + estimated 200,000 flow diverted to the polishing pond pumping project = 2,398,253 total gallons.																																
	03-14-18 21:30 KT flow decreased from 1750 gpm to approximately 826 gpm. Ph set point was increased to 8.50 from 8.40.																																
	03-15-18 Past 24hr flow estimated: 1,682,328 outfall flow meter reading + estimated 200,000 flow diverted to the polishing pond pumping project = 1,882,328 total gallons.																																
	03-16-18 Past 24hr flow estimated: 1,204,034 outfall flow meter reading + estimated 419,386 flow diverted to the polishing pond pumping project = 1,623,420 total gallons.																																
	03-16-18 11:30 KT flow of approximately 820 gpm increased to 1750 gpm. PH set point was decreased from 8.5 to 8.4																																
	03-17-18 Past 24hr flows estimated: 1,935,860 outfall flow meter reading + estimated 261,740 flow diverted to the polishing pond pumping project = 2,197,600 total gallons.																																
	03-18-18 22:30 Mine flow increased to approximately 2500 gpm causing low pH alarms and low lime feed rate alarms. Operator performed manual lime feed adjustments for 2 hours.																																
	03-18-18 23:30 Mine flow was approximately 2100 gpm.																																
	03-19-18 00:20 Mine flow was approximately 1800 gpm																																
	03-19-18 10:30 Mine flow increased from 1800 gpm to approximately 2200 gpm. This was the second flow surge in a twelve hour period. 11:30 KT flow was 1850 gpm, decreasing from 2500 gpm.																																
	03-19-18 14:00 Mine flow decreased from approximately 1850 gpm to approximately 850 gpm as the mine pool pump was removed from service.																																
	03-19-18 15:00 Mine flow increased from approximately 850 gpm to 1850 gpm as the mine pool pump was activated.																																
	03-22-18 06:00 006 outfall flow meter not properly working. 24/hr. flow estimated from KT flow meter. KT flow is 2,520,000 - 72,000 gal. sludge pumping = 2,448,000 total gallons.																																
	03-22-18 006 outfall turbidity and pH readings are now collected from west side of Clarifier launder trough.																																
	03-23-18 06:00 006 outfall flow meter not properly working. 24/hr. flow estimated from KT flow meter. KT flow is 2,520,000 - 72,000 gal. sludge pumping = 2,448,000 total gallons.																																
	03-24-18 06:00 006 outfall flow meter not properly working. 24/hr. flow estimated from KT flow meter. KT flow is 2,520,000 - 72,000 gal. sludge pumping = 2,448,000 total gallons.																																
	03-25-18 06:00 006 outfall flow meter not properly working. 24/hr. flow estimated from KT flow meter. KT flow is 2,520,000 - 72,000 gal. sludge pumping = 2,448,000 total gallons.																																
	03-26-18 06:00 006 outfall flow meter not properly working. 24/hr. flow estimated from KT flow meter. KT flow is 2,520,000 - 72,000 gal. sludge pumping = 2,448,000 total gallons.																																
	03-26-18 10:30 Mine flow decreased from 1750 gpm to approximately 650 gpm as the mine pump was removed from service. pH 8.50 during low flow and lined pond pumping events.																																
	03-27-18 06:00 006 outfall flow estimated from KT discharge & Pond Pumping 1,431,750 deducting sludge pumping of 72,000 gal. and 200,000 gallons P.Pond dilution = 1,159,750 total gallons.																																
	03-27-18 past 24/hr discharge: 06:00-10:30=270min x 1750gpm (472,500), 10:30-10:45=15min x 650gpm (9,750), 10:45-13:00=135min x 2000gpm (270,000), 13:00-06:00=1020min x 650gpm (663,000) =Total 1,415,250 - 72,000 sludge, - 200,000 P.P. =1,1432,250																																
	03-27-18 06:00-13:00 Diverted KT flow of approximately 850 gpm to the lined storage pond. Activated the #3 lined storage pond pump from 06:00-13:00 approximately 2000 gpm.																																
	03-28-18 past 24/hr discharge: 06:00-13:00=420min x 2000gpm (840,000), 13:00-06:00=1020min x 850gpm (867,000), =Total 1,707,000 - 36,000 sludge, - 100,000 P.Pond pumping =1,571,000																																
	03-28-18 06:40-11:00 Diverted KT flow of approximately 850 gpm to the lined storage pond. Activated the #3 lined storage pond pump from 06:40-11:00 approximately 2000 gpm.																																
	03-29-18 to 03-31-18 past 24/hr discharge: 06:00-11:00=300min x 2000gpm (600,000), 11:00-06:00=1140min x 850gpm (969,000), =Total 1,569,000 - 39,000 sludge, - 100,000 P.Pond pumping =1,430,000																																
	03-29-18 11:30 Mine flow increased from 826 gpm to approximately 1900 gpm. The mine pool pump was activated.																																
	03-30-18 to 03-31-18 past 24/hr discharge: 06:00-11:30=330min x 850gpm (280,000), 11:30-06:00=1110min x 1900gpm (2,109,000), =Total 2,389,000 - 36,000 sludge, - 53,000 P.Pond pumping =1,430,000																																
	03-31-18 past 24/hr discharge: 06:00-06:00=1440min x 1900gpm (2736,000), - 72,000 sludge =2,664,000																																

CENTRAL TREATMENT PLANT **MISCELLANEOUS FLOWS**

Month : **Mar-18**

Date	**KT Flow Meter Reading**
2/28/2018	0
3/31/2018	68,907,980
Total	68,907,980

Date	**006 Flow Meter Reading**
2/28/2018	0
3/31/2018	68,721,800
Total	68,721,800

Lined Storage Pond Influent Flows

Sweeny Pump Station Reading

Date	#1 Pump	620 gpm	#2 Pump	500 gpm
2/28/2018	170.0	Hours	785.0	Hours
3/31/2018	170.0	Hours	785.0	Hours
Total Hours	0.0	Hours	0.0	Hours
Total Flow for 004/Sweeny For The Month =			0	Gallons

PTM Discharge Flow

Date	Flow (gpm)
03/08/18	10.0
03/22/18	20.0

Date	**Lined Storage Pond Water Level**			
2/28/2018	1,250,000	gal	Elev. =	2269.5
3/31/2018	750,000	gal	Elev. =	2268.5

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Old Mine Line Discharge Flow

Date	Flow (gpm)
NA	NA

2017-May 03 to 2018-May 02 BHCTP LIME USAGE AFW/WOOD

	Silo A						Silo B						Total	
Month	Initial Level	Final Level	Diff. (ft)	Diff. (tons)	Tons Added	Net Tons	Initial Level	Final Level	Diff. (ft)	Diff. (tons)	Tons Added	Net Tons	Net Tons	Tons/Day
Jan 1 - Jan 31	11.70	13.30	-1.6	-8.6	72.20	63.6	16.30	16.30	0.0	0.0	0.00	0.0	63.6	2.05
Feb 1-Feb 28	13.30	15.50	-2.2	-11.9	40.50	28.6	16.30	13.80	2.5	13.5	42.10	55.6	84.2	3.01
Mar 1 - Mar 31	15.30	15.30	0.0	0.0	0.00	0.0	13.80	10.00	3.8	20.5	81.00	101.5	101.5	3.27
April 1 - April 30	15.30	15.30	0.0	0.0	0.00	0.0	10.00	10.00	0.0	0.0	0.00	0.0	0.0	0.00
				Silo A	**112.70**					**Silo B**	**123.10**		63.6	
						Tdl Tons Purchased		**235.80**					**Average**	**2.78**

NOTES:
08-22-17 Slaker B (Silo B) removed from service, Slake A (Silo A) placed into service - Six Month Rotation- Lime loop #2 off, Lime loop #1 on
Six Month Rotation - January 1, 2018 A= 11.7 B = 16.3
01-23-18 Lime loop #1 removed from service, lime loop #2 placed into service. #1 lime loop discharge pipe found leaking, will be replaced as
01-24-18 Lime loop #1 repaired and placed into service as the primary lime slurry injection system. Lime loop #2 was also repaired.
02-12-18 Slaker A (Silo A) removed from service, Slake B (Silo B) placed into service - Six Month Rotation- Lime loop #1 off, Lime loop #2 on
Six Month Rotation - February 11, 2018 A= 15.0 B = 16.3

	Silo A	Silo B	
	15.3	**12.0**	**FT**
6.20 Tons per foot =	**94.9**	**74.4**	**Tons**
30% Contingency	**-28.5**	**-22.3**	**FT**
Working Tons	**66.4**	**52.1**	
Past 7 days usage	**3.7**	**3.7**	**Tons/day**
		Days of usage remaining less 30% contingency	
Days remaining	**17.8**	**14.0**	**31.8**

2005	Average	2.59		
2006	Average	3.23		
2007	Average	2.76		
2008	Average	4.78		
2008 EXT.	Average	3.24		
2009-2010	Average	2.16		
2010-2011	Average	4.31		
2011-2012	Average	3.93		
2012 Ext	Average	2.70		
2013-2014	Average	2.40		
2014/Op #1	2/11/14-8/10/14	Average	3.33	
14-15/Op #2	8/11/14-2/10/15	Average	1.91	
2015 Op #3	2/11/15-8/10/15	Average	2.59	
15-16 Op #4	8/11/15-2/10/16	Average	1.50	
2016 Op #4 ext	2/11/16-8/10/16	Average	2.49	
16-17 Ext	8/11/16-1/10/17	Average	1.68	
Jan - May 2 2017	1/11/17-05-02-17 5-03-17-12-31-1	Average	0.00 3.86	

Lime Daily Use - 7 Days

	Silo A						Silo B						Total	
	Initial Level	Final Level	Diff. (ft)	Diff. (tons)	Tons Added	Net Tons	Initial Level	Final Level	Diff. (ft)	Diff. (tons)	Tons Added	Net Tons	Net Tons	Tons/Day
03/19-03/27	15.30	15.30	0.0	0.0	0.00	0.0	10.00	12.00	-2.0	-10.8	38.50	27.7	27.7	3.08

Lime Silo A Depth Readings

Date	Prior	After	Tons Received	Tons/ft
1/8/2018	9.9	14.4	33.70	7.49
1/29/2018	8.8	13.8	38.50	7.70
2/14/2018	9.4	15.0	40.50	7.23
1 Month Average:				**7.47**

Lime Silo B Depth Readings

Date	Prior	After	Tons Received	Tons/ft
2/26/2018	8.5	14.5	42.10	7.02
3/7/2018	9.8	16.4	42.50	6.44
3/19/2018	10.0	16.4	38.50	6.02
4/2/2018				
1 Month Average:				**6.49**

Flocculant Received

10/19/2017	2200 lbs	
12/12/2017	4400 lbs	
3/19/2018	4400 lbs	7/weeks

LIME DEMAND TRACKING

Year	Month	Lime (tons)	KT flow (mg)	Lime Demand (g/L)	
2006	Jan.	70.2	56.0	0.30	
	Feb.	69.9	51.2	0.33	
	March	96.3	56.3	0.41	
	April	107.5	72.0	0.36	
	May	235.4	72.0	0.78	peak
	June	114.6	68.3	0.40	
	July	100.4	64.0	0.38	
	Aug.	118.2	64.1	0.44	
	Sept.	38.4	54.5	0.17	
	Oct.	69.5	57.6	0.29	
	Nov.	71.3	55.2	0.31	
	Dec.	78.2	60.5	0.31	
2007	Jan.	66.0	56.3	0.28	
	Feb.	51.8	50.5	0.25	
	March	81.7	65.4	0.30	
	April	127.9	66.6	0.46	
	May	154.0	63.2	0.58	peak
	June	94.1	57.9	0.39	
	July	107.0	58.3	0.44	
	Aug.	75.8	55.3	0.33	
	Sept.	77.2	50.5	0.37	
	Oct.	62.3	50.1	0.30	
	Nov.	56.9	50.8	0.27	
	Dec.	28.1	52.0	0.13	
2008	Jan.	60.7	53.4	0.27	
	Feb.	50.2	49.3	0.24	
	March	58.0	54.6	0.25	
	April	78.3	61.7	0.30	
	May	629.3	86.7	1.74	peak
	June	388.1	82.6	1.13	
	July	155.6	66.3	0.56	
	Aug.	129.5	65.2	0.48	
	Sept.	97.2	61.1	0.38	
	Oct.	76.4	58.7	0.31	
	Nov.	64.9	52.0	0.30	
	Dec.	73.0	55.7	0.31	
2009	Jan.	70.3	50.9	0.33	
	Feb.	60.3	48.2	0.30	
	March	62.1	61.7	0.24	
	April	88.0	63.1	0.33	
	May	180.9	70.2	0.62	peak
	June	146.3	64.6	0.54	
	July	104.4	61.6	0.41	
	Aug.	94.8	56.4	0.40	
	Sept.	89.2	57.0	0.38	
	Oct.	69.4	55.8	0.30	
	Nov.	70.9	55.0	0.31	
	Dec.	47.4	54.5	0.21	
2010	Jan.	66.7	55.5	0.29	
	Feb.	51.5	50.8	0.24	
	March	49.5	54.7	0.22	
	April	50.0	56.3	0.21	
	May	58.7	58.8	0.24	
	June	58.8	56.8	0.25	
	July	79.7	56.7	0.34	peak
	Aug.	54.7	56.2	0.23	
	Sept.	63.8	54.1	0.28	
	Oct.	54.6	55.4	0.24	
	Nov.	54.1	55.8	0.23	
	Dec.	64.5	54.6	0.28	
2011	Jan.	77.1	61.7	0.30	
	Feb.	69.8	54.6	0.31	
	March	94.7	61.4	0.37	
	April	119.6	65.6	0.44	
	May	433.0	84.4	1.23	peak
	June	328.4	80.0	0.98	
	July	159.9	79.3	0.48	
	Aug.	120.8	70.3	0.41	
	Sept.	92.4	60.4	0.37	
	Oct.	97.8	62.4	0.38	
	Nov.	66.8	58.4	0.27	
	Dec.	65.2	58.6	0.27	
2012	Jan.	74.9	58.4	0.31	
	Feb.	56.8	57.7	0.24	
	March	85.6	67.2	0.31	

LIME DEMAND TRACKING

Year	Month	Lime (tons)	KT flow (mg)	Lime Demand (g/L)	
	April	194.8	81.2	0.57	
	May	261.6	86.8	0.72	peak
	June	179.9	83.4	0.52	
	July	140.8	74.3	0.45	
	Aug.	118.0	68.9	0.41	
	Sept.	95.6	62.2	0.37	
	Oct.	89.0	60.0	0.36	
	Nov.	73.3	57.2	0.31	
	Dec.	74.8	61.8	0.29	
2013	Jan.	57.2	61.9	0.22	
	Feb.	64.5	59.4	0.26	
	March	71.7	66.2	0.26	
	April	96.9	69.6	0.33	
	May	126.2	71.5	0.42	peak
	June	94.1	64.6	0.35	
	July	91.2	62.8	0.35	
	Aug.	89.2	58.4	0.37	
	Sept.	65.2	58.0	0.27	
	Oct.	59.3	58.3	0.24	
	Nov.	50.9	56.2	0.22	
	Dec.	49.9	56.9	0.21	
2014	Jan.	38.7	57.4	0.16	
	Feb.	35.8	54.6	0.16	
	March	73.1	65.3	0.27	
	April	101.1	65.6	0.37	
	May	208.3	80.6	0.62	peak
	June	127.4	65.6	0.47	
	July	87.5	63.4	0.33	
	Aug.	81.1	61.5	0.32	
	Sept.	63.7	56.3	0.27	
	Oct.	53.1	60.6	0.21	
	Nov.	62.8	55.0	0.27	
	Dec.	54.6	59.7	0.22	
2015	Jan.	51.7	58.4	0.21	
	Feb.	61.0	59.7	0.24	
	March	83.1	64.4	0.31	
	April	94.8	63.0	0.36	peak
	May	73.3	62.0	0.28	
	June	69.7	65.3	0.26	
	July	83.6	55.6	0.36	
	Aug.	58.4	55.3	0.25	
	Sept.	55.3	53.9	0.25	
	Oct.	56.8	52.0	0.26	
	Nov.	46.3	49.8	0.22	
	Dec.	43.7	51.5	0.20	
2016	Jan.	24.2	52.2	0.11	
	Feb.	33.4	53.6	0.15	
	March	66.0	64.0	0.25	
	April	86.1	63.3	0.33	
	May	96.9	58.1	0.40	peak
	June	69.9	53.1	0.32	
	July	68.2	56.5	0.29	
	Aug.	53.7	53.2	0.24	
	Sept.	53.6	49.8	0.26	
	Oct.	49.8	52.4	0.23	
	Nov.	48.7	53.8	0.22	
	Dec.	48.3	52.0	0.22	
2017	Jan.	51.7	49.3	0.25	
	Feb.	46.9	53.7	0.21	
	March	140.0	59.0	0.57	
	April	174.5	61.9	0.68	
	May	246.6	84.2	0.70	peak
	June	143.5	73.1	0.47	
	July	141.6	69.4	0.49	
	Aug.	87.6	58.5	0.36	
	Sept.	100.8	67.4	0.36	
	Oct.	60.8	43.5	0.34	
	Nov.	91.0	72.4	0.30	
	Dec.	76.3	67.3	0.27	
2018	Jan.	63.6	56.5	0.27	
	Feb.	84.2	61.0	0.33	
	March	101.5	68.9	0.35	

KELLOGG TUNNEL ZINC DATA

			Concentration (mg/L)											
Month	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Jan.		86	81	79	63	70	61	72	57	68	41	46	50	53	53
Feb.		86	91	96	55	72	57	95	58	68	41	68	52	50	85
March		94	116	86	65	68	53	86	58	69	58	81	63	124	88
April		98	121	140	85	80	50	137	176	86	107	92	115	238	
May		105	231	179	318	136	57	377	215	150	177	87	138	206	
June		107	182	118	271	143	68	347	164	106	131	78	108	145	
July		90	144	111	198	117	75	181	136	87	87	75	81	97	
Aug.		87	112	92	132	94	79	130	110	86	76	66	76	98	
Sept.		84	107	80	107	76	81	132	107	75	66	63	68	75	
Oct.	59	81	100	88	99	75	70	86	70	67	63	54	52	53	
Nov.	66	79	88	88	104	63	57	95	71	70	55	44	52	58	
Dec.	67	62	78	65	76	59	61	88	69	54	49	55	50	60	
average	**64**	**88**	**121**	**102**	**131**	**88**	**64**	**152**	**108**	**82**	**79**	**67**	**75**	**105**	
lime usage (tons/day)		**2.59**	**3.23**	**2.76**	**4.78**	**3.24**	**2.16**	**4.31**	**3.93**	**2.46**	**2.70**	**1.99**	**1.93**	**3.60**	
Zinc Conc. Increase/Decrease			**37%**	**-16%**	**29%**	**-33%**	**-27%**	**138%**	**-29%**	**-24%**	**-4%**	**-15%**	**12%**	**39%**	
Lime Usage Increase/Decrease			**25%**	**-15%**	**73%**	**-32%**	**-33%**	**100%**	**-9%**	**-37%**	**10%**	**-26%**	**-3%**	**87%**	

KELLOGG TUNNEL ANNUAL DISCHARGE FLOWS 2000-2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Jan.	61,000,000	61,677,510	54,606,100	53,066,890	52,223,080	53,150,000	56,050,900	56,281,000	53,465,820	50,936,960
Feb.	57,600,000	45,584,000	52,840,000	46,493,470	48,306,920	49,860,000	51,188,000	50,511,300	49,282,209	48,146,111
March	60,730,000	57,740,360	50,452,060	60,162,290	59,852,720	58,073,000	56,332,830	65,443,650	54,578,130	61,712,540
April	68,680,000	54,846,000	65,583,230	63,335,350	50,715,310	53,775,350	72,039,280	66,636,500	61,690,530	63,055,350
May	**97,719,900**	57,501,901	76,082,410	63,335,350	53,245,000	54,181,650	72,027,000	63,203,308	86,680,760	70,233,580
June	69,800,000	55,835,590	67,299,960	59,532,434	50,451,170	51,750,000	68,385,600	57,981,410	82,622,590	64,623,180
July	63,698,850	53,652,330	64,820,120	66,252,746	56,538,980	55,255,000	64,054,000	58,282,900	66,324,500	61,535,000
Aug.	66,707,120	45,289,000	58,212,940	62,074,750	52,002,140	49,970,000	64,621,000	55,335,900	65,168,620	56,446,670
Sept.	55,797,530	50,276,020	60,140,460	43,789,000	49,208,020	49,987,000	54,515,270	50,471,870	61,074,020	57,006,430
Oct.	60,424,720	50,660,840	54,485,871	52,869,290	59,601,690	52,807,000	57,610,030	50,086,330	58,666,300	55,830,000
Nov.	53,408,660	50,660,840	51,072,259	47,600,000	51,948,000	50,722,600	55,191,700	50,779,040	52,041,780	54,956,800
Dec.	56,414,870	53,464,780	56,034,000	56,413,080	56,770,000	54,904,400	60,486,900	53,716,210	55,727,260	54,542,700
Totals	771,981,650	637,189,171	711,629,410	674,924,650	640,863,030	634,436,000	732,502,510	678,729,418	747,322,519	699,025,321

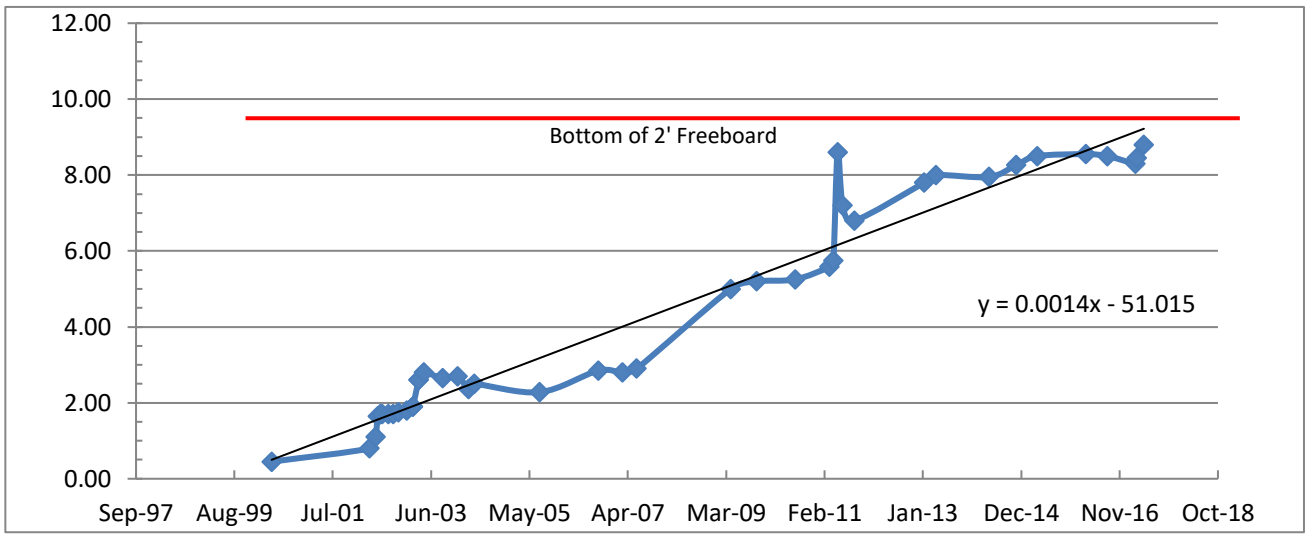
KELLOGG TUNNEL ANNUAL DISCHARGE FLOWS 2010-2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Jan.	55,503,180	61,797,170	58,434,610	**61,855,400**	57,478,450	58,440,540	52,196,750	49,352,650	56,555,500	
Feb.	50,819,910	54,556,227	57,763,170	59,383,290	54,607,950	59,767,470	53,694,400	53,675,440	**61,451,600**	
March	54,691,420	61,373,630	67,236,650	66,264,780	65,396,350	64,468,230	63,967,920	58,977,410	**68,907,980**	
April	56,255,340	65,687,340	**81,233,630**	69,619,100	65,618,770	63,056,840	63,323,620	61,947,620		
May	58,825,640	84,365,390	**86,826,340**	71,496,380	80,598,590	61,898,200	58,147,240	84,208,690		
June	56,770,200	79,985,540	**83,440,990**	64,663,900	65,623,330	56,368,540	53,149,810	73,144,700		
July	56,727,510	**79,346,330**	74,315,690	62,844,790	63,425,030	55,655,000	56,521,710	69,470,550		
Aug.	56,239,370	**70,377,570**	68,986,900	58,459,380	61,486,270	55,316,100	53,293,430	58,550,600		
Sept.	54,109,980	60,404,280	**62,270,300**	58,097,500	56,279,590	53,890,000	49,796,420	67,447,510		
Oct.	55,480,200	**62,403,480**	59,991,850	58,325,780	60,659,850	52,082,800	52,417,120	43,469,300		
Nov.	54,856,880	**58,430,700**	57,184,220	56,215,000	55,065,100	49,812,540	53,815,710	72,434,860		
Dec.	54,607,330	58,617,700	**61,750,390**	56,932,530	59,770,540	51,521,900	52,063,110	67,280,860		
Totals	664,886,960	797,345,357	**819,434,740**	**744,157,830**	**746,009,820**	**682,278,160**	**662,387,240**	**759,960,190**	**186,915,080**	**0**

Yellow indicates record monthly flow as well as record annual flow

Bunker Hill Sludge Pond
Sludge Staff Gauge Reading Summary

Date	Sludge Level (feet)	Estimated Sludge Elevation	Estimated Remaining Height to Road (feet)	
05/19/00	0.45			
04/16/02	0.80			
05/28/02	1.10			
06/13/02	1.65			
07/01/02	1.70			
07/16/02	1.70			
08/27/02	1.70			
10/01/02	1.70			
11/06/02	1.75			
01/06/03	1.80			
02/19/03	1.90			
02/19/03	1.90			
03/31/03	2.60			
04/01/03	2.60			
05/07/03	2.80			
09/19/03	2.65			
01/01/04	2.70			
03/22/04	2.36			
04/29/04	2.50	2311	11.0	
08/09/05	2.28	2310.8	11.2	
09/30/06	2.85	2311.4	10.7	
03/20/07	2.80	2311.3	10.7	
6/30/2007	2.90	2311.4	10.6	
4/30/2009	5.00	2313.5	8.50	
10/31/2009	5.20	2313.7	8.30	
7/31/2010	5.25	2313.8	8.25	
3/31/2011	5.58	2314.1	7.92	
4/30/2011	5.75	2314.3	7.75	
5/30/2011	8.60	2317.1	4.90	
7/5/2011	7.20	2315.7	6.30	
9/26/2011	6.80	2315.3	6.70	
2/4/2013	7.80	2316.3	5.70	
4/30/2013	8.00	2316.5	5.50	
5/12/2014	7.95	2316.5	5.55	
11/20/2014	8.26	2316.8	5.24	
4/20/2015	8.50	2317.0	5.00	
4/1/2016	8.55	2317.1	4.95	
9/1/2016	8.50	2317.0	5.00	
3/20/2017	8.30	2316.8	5.20	
3/28/2017	8.45	2317.0	5.05	
5/18/2017	8.80	2317.3	4.70	
7/31/2017	8.75	2317.3	4.75	
11/15/2017	8.80	2317.3	4.70	
3/1/2018	9.14	2317.6	4.36	03-08-18 Polishing Pond Cleanout to CIA
3/27/2018	9.15	2317.7	2.35	
4/9/2018	9.25	2317.8	2.25	
6534	**8.80**	**Total Change, Days and Feet**		
Note 3	0.49	Average Rise Per Year (Includes Lined Pond Cleanout), feet		
	2.25	Estimated average remaining total height to perimeter road, feet		
	2.0	Assumed desired end-of-life freeboard, feet		
	0.3	Estimated available storage height, feet		
	0.51	**Estimated Remaining Life (years)**		
	10/11/2018			



Notes:
1) Pond perimeter road centerline elevation = 2322.0 feet from CIA as-builts Drawing C-28 **03-27-18 GF Est. Road Elevation 2320.0**
2) Pond area is approximately 220,000 square feet (not used in calculations)
in Lined Pond
precipitated in Lined Pond

CTP Mine Water Line Open Channel Inspection Form

Note: This form should be utilized weekly during the regular channel cleanout.
Results will be include with the Daily Quality Control Report and monthly DMR.

Date: March 01, 2018 Inspected By: Steve Brunner, Gary Coast

Item Inspected	Condition	Comments
Channel Sections and Joints	**Good** / Poor	Check for cracks Ok
Channel Inlet Connection @ KT	**Good** / Poor	Check for cracks Ok
Channel Outlet/Pipeline Inlet	**Good** / Poor	Check for cracks Ok
Channel Bottom (during low flows)	**Good** / Poor	Concrete walls show signs of pitting/corrosion
Bottom Joints (during low flows)	**Good** / Poor	Ok
Trash Rack Assembly Rail Units	**Good** / Poor	Check for corrosion and bolt tightness Ok
Trash Racks	**Good** / Poor	Wood debris was removed
Parshall Flume	**Good** / Poor	Check fiberglass and joint connections Ok Flume staff gauge needs replaced

General Comments:

The Kellogg Tunnel flow at this time is 2.43 mgd (1690gpm), pH at this time is 2.69.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed wood and trash debris from the trash racks during this cleaning event.

CTP operators had no contact with any mine personnel during this cleaning event.

CTP Mine Water Line Open Channel Inspection Form

Note: This form should be utilized weekly during the regular channel cleanout.
Results will be include with the Daily Quality Control Report and monthly DMR.

Date: March 08, 2018 Inspected By: Steve Brunner, Gary Coast

Item Inspected	Condition	Comments
Channel Sections and Joints	**Good** / Poor	Check for cracks Ok
Channel Inlet Connection @ KT	**Good** / Poor	Check for cracks Ok
Channel Outlet/Pipeline Inlet	**Good** / Poor	Check for cracks Ok
Channel Bottom (during low flows)	**Good** / Poor	Concrete walls show signs of pitting/corrosion
Bottom Joints (during low flows)	**Good** / Poor	Ok
Trash Rack Assembly Rail Units	**Good** / Poor	Check for corrosion and bolt tightness Ok
Trash Racks	**Good** / Poor	Wood debris was removed
Parshall Flume	**Good** / Poor	Check fiberglass and joint connections Ok Flume staff gauge needs replaced

General Comments:

The Kellogg Tunnel flow at this time is 2.30 mgd (1597 gpm), pH at this time is 2.67.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed wood and from the trash racks during this cleaning event.

CTP operators had no contact with any mine personnel during this cleaning event.

CTP Mine Water Line Open Channel Inspection Form

Note: This form should be utilized weekly during the regular channel cleanout.
Results will be include with the Daily Quality Control Report and monthly DMR.

Date: March 15, 2018 Inspected By: Gary Coast, Steve Brunner

Item Inspected	Condition	Comments
Channel Sections and Joints	**Good** / Poor	Check for cracks Ok
Channel Inlet Connection @ KT	**Good** / Poor	Check for cracks Ok
Channel Outlet/Pipeline Inlet	**Good** / Poor	Check for cracks Ok
Channel Bottom (during low flows)	**Good** / Poor	Concrete walls show signs of pitting/corrosion
Bottom Joints (during low flows)	**Good** / Poor	Ok
Trash Rack Assembly Rail Units	**Good** / Poor	Check for corrosion and bolt tightness Ok
Trash Racks	**Good** / Poor	Wood debris was removed from both racks
Parshall Flume	**Good** / Poor	Check fiberglass and joint connections Ok Flume staff gauge needs replaced

General Comments:

The Kellogg Tunnel flow at this time is 1.19 mgd (826 gpm), pH at this time is 2.42.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed trash debris from the mine discharge flume during this cleaning event.

No discussions occurred with any mine personnel.

CTP Mine Water Line Open Channel Inspection Form

Note: This form should be utilized weekly during the regular channel cleanout.
Results will be include with the Daily Quality Control Report and monthly DMR.

Date: March 22, 2018 Inspected By: Gary Coast, Steve Brunner

Item Inspected	Condition	Comments
Channel Sections and Joints	**Good** / Poor	Check for cracks Ok
Channel Inlet Connection @ KT	**Good** / Poor	Check for cracks Ok
Channel Outlet/Pipeline Inlet	**Good** / Poor	Check for cracks Ok
Channel Bottom (during low flows)	**Good** / Poor	Concrete walls show signs of pitting/corrosion
Bottom Joints (during low flows)	**Good** / Poor	Ok
Trash Rack Assembly Rail Units	**Good** / Poor	Check for corrosion and bolt tightness Ok
Trash Racks	**Good** / Poor	No debris ok
Parshall Flume	**Good** / Poor	Check fiberglass and joint connections Ok Flume staff gauge needs replaced

General Comments:

The Kellogg Tunnel flow at this time is 2.52 mgd (1750 gpm), pH at this time is 2.64.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed wood debris from the trash racks during this cleaning event.

No discussions occurred with any of the mine personnel.

CTP Mine Water Line Open Channel Inspection Form

Note: This form should be utilized weekly during the regular channel cleanout.
Results will be include with the Daily Quality Control Report and monthly DMR.

Date: March 29, 2018 Inspected By: Gary Coast, Steve Brunner

Item Inspected	Condition	Comments
Channel Sections and Joints	**Good** / Poor	Check for cracks Ok
Channel Inlet Connection @ KT	**Good** / Poor	Check for cracks Ok
Channel Outlet/Pipeline Inlet	**Good** / Poor	Check for cracks Ok
Channel Bottom (during low flows)	**Good** / Poor	Concrete walls show signs of pitting/corrosion
Bottom Joints (during low flows)	**Good** / Poor	Ok
Trash Rack Assembly Rail Units	**Good** / Poor	Check for corrosion and bolt tightness Ok
Trash Racks	**Good** / Poor	No debris ok
Parshall Flume	**Good** / Poor	Check fiberglass and joint connections Ok Flume staff gauge needs replaced

General Comments:

The Kellogg Tunnel flow at this time is 1.19 mgd (826 gpm), pH at this time is 2.40.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed wood debris from the trash racks during this cleaning event.

No discussions occurred with any of the mine personnel.